



**RECEIVED IN THE U.S. PATENT AND TRADEMARK OFFICE**

INVENTOR(S): **Hirotooshi KUBO et al.**  
SERIAL NO.: **10/016,142**  
FILING DATE: **December 17, 2001**  
TITLE: **SEMICONDUCTOR DEVICE  
AND MANUFACTURING  
METHOD THEREOF**

ATTORNEY DOCKET:  
**49232-20026.00**

Papers enclosed herewith:

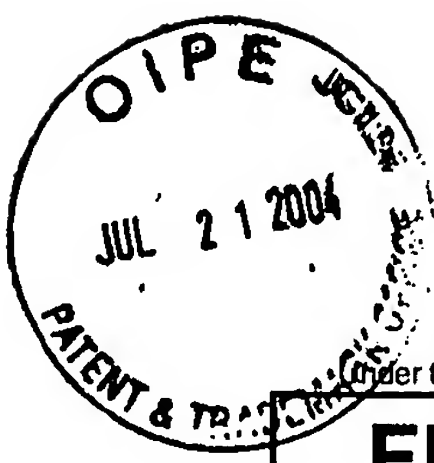
- 1) Request for Continued Examination (RCE) Transmittal
- 2) Fee Transmittal
- 3) Petition for Extension of Time (one months)
- 4) Information Disclosure Statement
- 5) Copy of Office Action issued in US Appln No. 09/919,797
- 6) Form PTO 1449 with three (3) references

Via: Courier

Initials: BEB/TF/nej

Date filed: July 21, 2004

wa-69452



2812 ✓

PTO/SB/17 (10-03)  
Approved for use through 7/31/2006. OMB 0651-0032  
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# FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

<b>TOTAL AMOUNT OF PAYMENT</b>	<b>(\$)</b> 880.00
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## Complete if Known

Application Number	10/016,142
Filing Date	December 17, 2001
First Named Inventor	Hirotohi KUBO
Examiner Name	Christopher W. Lattin
Art Unit	2812
Attorney Docket No.	492322002600

## METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ Other ☐ None

☒ Deposit Account:

Deposit Account Number: 03-1952

Deposit Account Name: Morrison & Foerster LLP

The Director is authorized to: (check all that apply)

☒ Charge fee(s) indicated below ☒ Credit any overpayments

☒ Charge any additional fee(s) or any underpayment of fee(s)

☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

## FEE CALCULATION

### 1. BASIC FILING FEE

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

**SUBTOTAL (1)** (\$ ) 0.00

### 2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

Total Claims		** =		x		=	
Independent Claims		** =		x		=	
Multiple Dependent						=	

Large Entity		Small Entity		Fee Description
Fee Code	Fee (\$)	Fee Code	Fee (\$)	
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

**SUBTOTAL (2)** (\$ ) 0.00

\*\*or number previously paid, if greater; For Reissues, see above

## FEE CALCULATION (continued)

### 3. ADDITIONAL FEES

Large Entity		Small Entity		Fee Description	Fee Paid
Fee Code	Fee (\$)	Fee Code	Fee (\$)		
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for <i>ex parte</i> reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	110.00
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	770.00
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify)

\*Reduced by Basic Filing Fee Paid

**SUBTOTAL (3)** (\$ ) 880.00

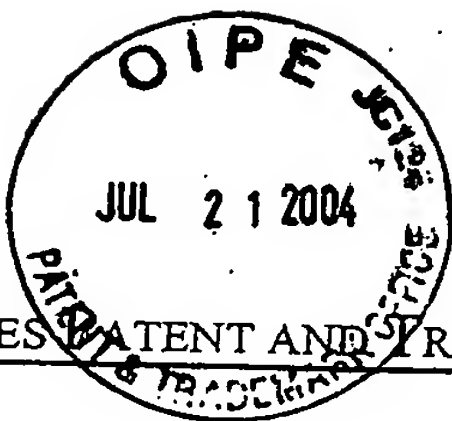
## SUBMITTED BY

Name (Print/Type)	Barry E. Bretschneider	Registration No. (Attorney/Agent)	28,055	Telephone	(703) 760-7743
Signature				Date	July 21, 2004

I hereby certify that this correspondence is being hand delivered to: Customer Window, MS RCE, U.S. Patent and Trademark Office, 220 20th Street S., Crystal Plaza Two, Lobby, Room 1B03, Arlington, Virginia 22202, on the date shown below.

Dated: July 21, 2004

Signature: (Nadine Johnson)



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/919,797	08/02/2001	Hirotohi Kubo	2001-1101	4860
513 7590 12/15/2003 WENDEROTH, LIND & PONACK, L.L.P. 2033 K STREET N. W. SUITE 800 WASHINGTON, DC 20006-1021				
			EXAMINER VOCKRODT, JEFF B	
			ART UNIT 2822	PAPER NUMBER

DATE MAILED: 12/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

RECEIVED  
DEC 17 2003  
WENDEROTH, LIND & PONACK

# Office Action Summary

Application No.

09/919,797

Applicant(s)

KUBO, HIROTOSHI

Examiner

Jeff Vockrodt

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 30 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,3,4 and 6-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,4 and 6-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

### DETAILED ACTION

This office action is in response to the amendment filed on September 30, 2003. Claims 1, 3-4, and 6-17 are pending.

#### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3-4, 8-13, 16-17 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Pat. No. 5,340,753 ("Bassous").

Claim 1 reads on Bassous as follows: A method of manufacturing a semiconductor device, comprising:

forming a collector layer (56) of a first conductivity type;

forming a base region (22, 24, 26) of a second conductivity type on a top surface of said collector layer of said first conductivity type, said first conductivity type being opposite said second conductivity type, said base region being formed using epitaxial growth technology (¶¶ bridging cols. 3-4), and being formed as a single region having a uniform impurity concentration with respect to a width direction of the base region (the impurity concentration is uniform in the width direction);

forming a groove (emitter window 34) in a top surface of said base region (22, 24, 26) at a portion thereof;

forming spacers (44) on sidewalls of said groove;

forming a diffusion source film (46) in said bottom of said groove to be embedded therein between said spacers (44); and

forming an emitter region (48) of said first conductivity type in said base region at a bottom surface of said groove, said emitter region being formed in said top surface of said base region at a bottom of said diffusion source film between said spacers (Fig. 10).

Claims 3, 8. The emitter is out diffused from the N+ polysilicon diffusion source film (46). (col. 5, ll. 4-16).

Claims 4 and 13. The base region has a flat bottom (Fig. 10).

Claims 9-12 and 16-17. Bassous teaches forming the base region using in-situ doped epitaxial growth of silicon (§ bridging cols. 3-4)

Claim 12. Bassous teaches forming the base region using in-situ doped epitaxial growth of silicon (§ bridging cols. 3-4)

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-7 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bassous in view of U.S. Pat. No. 4,731,341 ("Kawakatsu").

Claims 6-7 and 14-15 differ from Bassous by forming an emitter electrode on the surface of the diffusion source film. Claims 7 and 15 differ from Bassous by forming the base and



emitter electrodes of aluminum. Bassous merely teaches a doped polysilicon diffusion source film (46) that serves as the emitter electrode.

Kawakatsu teaches forming a bipolar transistor utilizing an arsenic doped polysilicon emitter contact layer 116 from which the emitter dopants are diffused and an aluminum emitter electrode 116. (Kawakatsu, col. 4, ll. 50-60).

Bassous and Kawakatsu are analogous art. They are within the field of bipolar transistors and particularly teach forming diffused emitters.

Further forming an aluminum electrode onto the emitter electrode (46) of Bassous would have been obvious to one of ordinary skill in the art at the time of the invention. A person having ordinary skill in the art would have been motivated to form an aluminum electrode in addition to the emitter electrode of Bassous to facilitate improved electrical contact to the emitter as suggested by Kawakatsu.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1, 3-4, and 6-17 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Pat. No. 6,239,477 ("Johnson"). Johnson teaches an in-situ doped epitaxial base region (48, 52).

Any inquiry concerning communications from the examiner should be directed to Jeff Vockrodt at (703) 306-9144 who can be reached on weekdays from 9:30 am to 5:00 pm EST. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian, can be reached at (703) 308-4905.

Application/Control Number: 09/919,797

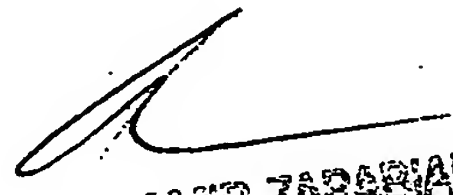
Art Unit: 2822

Page 5

The fax number for this group is 703-872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist at (703) 308-0956.

December 3, 2003

J. Vockrodt



AMIR ZARABIAN  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2000



# Notice of References Cited

Application/Control No.

09/919,797

Applicant(s)/Patent Under  
Reexamination  
KUBO, HIROTOSHI

Examiner

Jeff Vockrodt

Art Unit

2822

Page 1 of 1

## U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-5,340,753	08-1994	Bassous et al.	438/366
	B	US-6,239,477	05-2001	Johnson, F. Scott	257/592
*	C	US-4,997,775	03-1991	Cook et al.	438/322
*	D	US-4,731,341	03-1988	Kawakatsu, Akira	438/366
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

## FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

## NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.